INSTALLING AND OPERATING

INSTRUCTIONS

for the

Fischer Portable Diathermy Apparatus

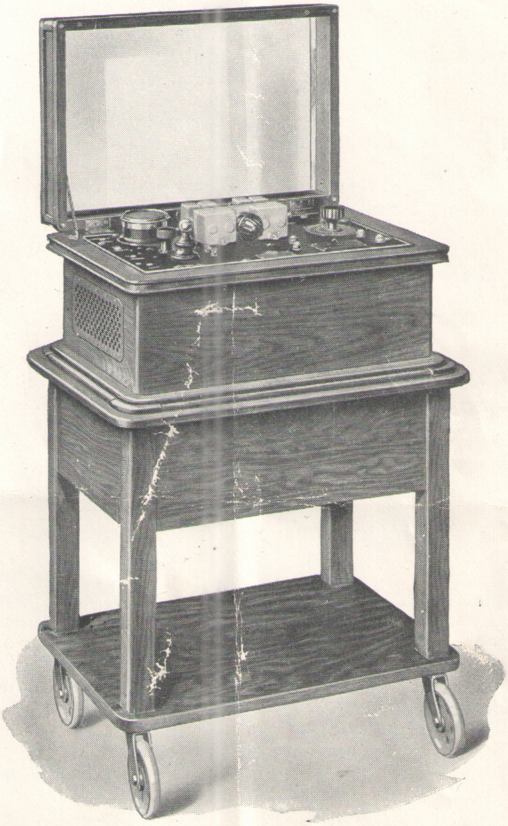
TYPES "G2" and "GP2"

H. G. FISCHER & CO., Inc.

Physiotherapy Headquarters

2323-37 Wabansia Avenue CHICAGO, ILLINOIS

Form No. 946



THE FISCHER "G2" HOSPITAL PORTABLE DIATHERMY UNIT

Catalog No. 1390

Mounted on Walnut Cart No. 1255

Explanation of Diagram on Opposite Page

No. 1—This terminal forms one outlet for all three diathermy circuits, and must always be used with one of the other three (low voltage, medium voltage, high voltage) diathermy outlets.

No. 2—Highest voltage diathermy terminal. To complete circuit to patient use outlets Nos. 1 and 2.

No. 3—Medium voltage terminal. To complete medium voltage circuit to patient use outlets Nos. 1 and 3.

No. 4—Lowest voltage terminal. To complete circuit to patient use outlets Nos. 1 and 4.

No. 5—Double scale milliampere meter: 0 to 1000 M. A. lower scale to be used for measuring small amounts of current, and the 0 to 4000 M. A. scale for the heavier discharges. (See paragraph on "Meter" for further information.)

No. 6—Control plate for meter No. 5. For reading of current discharge up to 1000 M. A. set indicator on 1000. Set indicator on 4000 for reading heavier currents. Be cautious when using lower scale, as should your cords or electrodes touch one another and create a short circuit, the meter is apt to burn out. The outfit may be operated without the meter by placing the indicator on "off" point.

No. 7—High tension high frequency Tesla pole for uni-polar discharge only. Not to be used in connection with any other outlet.

No. 8—Multiple Spark Gap. Tungsten points may be adjusted individually by means of small black knobs, or simultaneously with the large black master knob. One, two, three or four sets may be used, depending on the current output desired, although adjusting all points equal distances apart gives more uniform, satisfactory results.

No. 9—Pilot lamp. Indicates current on or off.

No. 10—Main controller. For weakest current discharge set indicator on point 1. Increase volume by turning indicator to right; point 9 being maximum.

No. 11—Line connection. Port of entry for 110 volt, 60 cycle alternating current, or as indicated on nameplate.

No. 12—Main switch. Button to right, and white dot showing, current ON. Button to left, current OFF.

No. 13—Terminal outlets for foot switch. When using foot switch leave main switch No. 12 in the OFF position.

No. 14—Protecting fuse for milliampere meter.

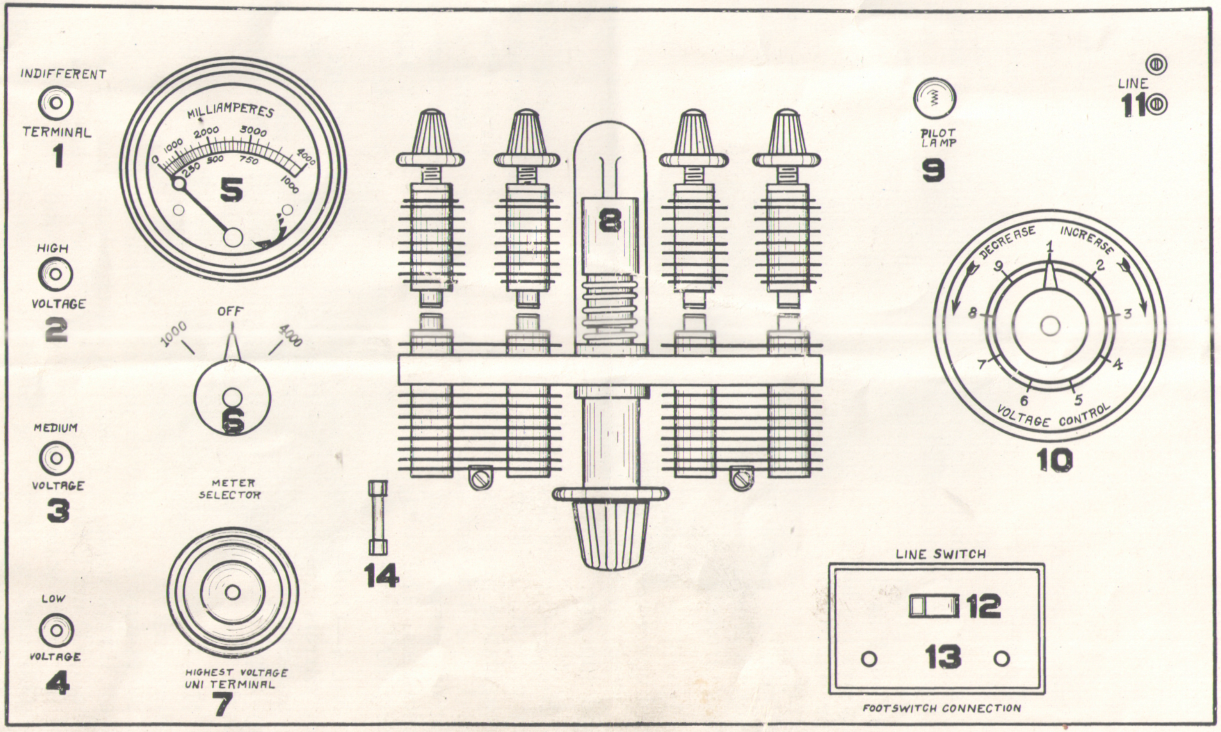

INDIFFERENT
TERMINAL
1
HIGH
VOLTAGE
2
MEDIUM
VOLTAGE
3
LOW
VOLTAGE
4
MILLIAMPERES
0
1000
2000
3000
4000
250
500
750
1000
5
1000
OFF
4000
6
METER
SELECTOR
HIGHEST VOLTAGE
UNI TERMINAL
7
14
8
PILOT
LAMP
9
LINE
11
DECREASE
INCREASE
1
2
3
4
5
6
7
8
9
VOLTAGE CONTROL
10
LINE SWITCH
12
13
FOOTSWITCH CONNECTION

Diagram of Controls and Outlets on "G2" Outfit

Detail Explanation of Panel Diagram

No. 1—This terminal, forming one outlet for all of the bi-polar diathermy circuits, must always be used with one of the other outlets, No. 2 for high voltage, No. 3 for medium voltage or No. 4 for low voltage, and if desired, with the highest voltage pole No. 7. No. 1 is not used in connection with No. 7 when the latter is to be used for monopolar discharge for high frequency glass vacuum and non-vacuum electrodes, monopolar dessication, fulguration, etc.

No. 2—Terminals Nos. 2, 3, 4 and 7 are merely different taps taken from the high voltage generating source in the cabinet, and before applying diathermy current the operator should estimate the type of current desired as compared to the resistance of the part to be treated, and use either of the four outlets in connection with No. 1 as desired. No. 2 when used in connection with No. 1 completes the highest voltage diathermy current available from the Type "G2" Cabinet. This current is mainly used for medical diathermy treatments where the resistance of the part is rather high, or for autocondensation purposes. The voltage across terminals Nos. 1 and 2 in combination is about 50% higher than across terminals Nos. 1 and 3.

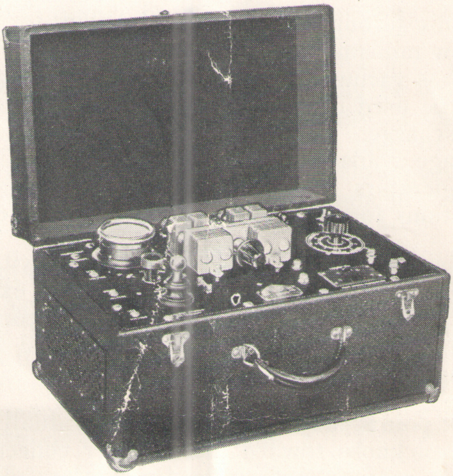
It will be found on test that while more current may be obtained under certain conditions when using terminals Nos. 1 and 2, that were these conditions changed other combinations will be found superior.

No. 3—Outlets Nos. 1 and 3 provide a medium voltage diathermy current. This current will be found suitable for certain electrocoagulation purposes, that is, where the voltage across terminals Nos. 1 and 4 is not sufficient to overcome the resistance at the point of operation, and for the majority of the medical diathermy applications. The voltage across terminals Nos. 1 and 3 is approximately 50% greater than across terminals Nos. 1 and 4.

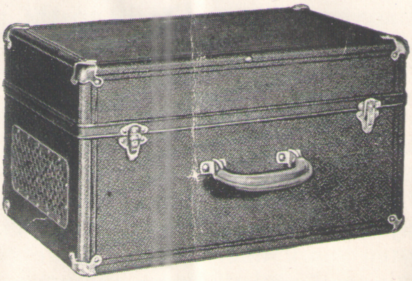
No. 4—Outlets Nos. 1 and 4 provide the lowest voltage diathermy current available. This current is mainly used for electrocoagulation (surgical diathermy) purposes, and for medical diathermy applications where the resistance of the part being treated is low.

No. 5—The milliampere meter is provided with two distinct windings, with an indicating scale for each, that the smaller current discharges may be read with just as much accuracy as the heavier loads. Always make sure that the meter selector control No. 7 is on the 1,000 mark for reading currents under 900 M. A. and then read the lower scale on the meter to correspond. Set indicator on the 4,000 mark when reading heavier currents, and read the upper scale to correspond. Were this meter provided only with a 4,000 M. A. scale, you would find it next to impossible to get accurate readings under 1,000 M. A., hence the double-scale.

THE FISCHER PHYSICIAN'S PORTABLE DIATHERMY UNIT



Showing Type "GP2" Open



Showing Type "GP2" Closed

Catalog No. 1393

No. 6—The selector switch is used in connection with the double-scale on meter No. 5. For the reading of heavy currents (anything over 900 milliamperes), set the indicator to the 4,000 mark and read the upper meter scale. For accurate readings of currents under 900 milliamperes, set the indicator to the 1,000 mark and read the lower scale on the meter. Were a one-scale meter provided, the operator would experience considerable difficulty in making accurate readings of any and all currents used, whereas with the double scale accurate readings are possible during all treatments.

No. 7—This terminal may be used either for unipolar, very high voltage low milliamperage applications (monopolar desiccation, for exciting glass vacuum and non-vacuum electrodes and fulguration), or may be used in conjunction with the terminal No. 1 for the bipolar discharge. The voltage here is exceedingly high, but the milliamperage available is correspondingly low. There are many well known operators who prefer exceedingly high voltage for certain applications for both unipolar and bipolar use.

No. 8—The multiple spark gap is provided with 8 electrically welded tungsten tips, and is constructed with extremely heavy radiating facilities, thus insuring two things: a constancy of current output at any voltage or milliamperage, and the elimination of over-heating.

The spark points may be adjusted individually by means of the small control knobs toward the back, or collectively by using the large master control knob to the front. Careful adjustment of this gap, and due consideration given to the auto control selector No. 10 will insure an even, resonant discharge of diathermy or high frequency current for any purpose. The operator may either adjust both controls Nos. 8 and 10, each in conformity with the other, to obtain true resonance of output, or, after you have mastered the machine you may set No. 10 to the point where you know the current desired can be obtained for the treatment at hand, and make your minimum to maximum adjustment with No. 8, entirely.

The spark interrupter gap is the most important regulating feature on any high frequency generator. Its function is to regulate the discharge of the high tension current in connection with control No. 10, and may be adjusted either with the current on or off. When the tungsten spark interrupter tips are closed, there is a direct short circuit on the transformer, and no discharge from any of the high tension outlets.

As these spark interrupter points are gradually separated, the high tension current passing across the gap produces an oscillating or vibratory effect (evidenced by sparking) which is increased up to that point where the voltage is insufficient and the sparking ceases. The highest rate of oscillations—that is, the highest frequency of discharge—is obtained with the spark interrupter points nearly closed. At this point, also, is obtained the very smoothest flow of current.

More milliamperage is obtained by separating the spark interrupter points. Should you separate these points so far that the sparking ceases, simply bring the points closer together and the sparking will be resumed.

The current discharge across the spark interrupter points ceases when the voltage is insufficient to carry across. Voltage is increased with control No. 10.

An individual pair of points, only, may be employed for the very lightest currents, or two pairs, or any number, if properly adjusted. It is inadvisable to have one pair of points widely separated, while the others are adjusted close together. For the best, most uniform discharge, we recommend using all points uniformly adjusted, wherever possible.

The sparking points are made of pure electrically welded tungsten—the hardest and most durable material available for this purpose. They need no attention whatever. They will not pit, become corroded, or with just ordinary care need any adjusting. The proper setting of the movable spark points is such that the tip extending from the bearing is practically the same length as the stationary tip on the opposite side.

Wipe gap occasionally with a dry cloth. Dust forms a conductor, and must be removed.

No. 9—The pilot lamp is used to indicate the fact that current is passing through the transformer. When the current is cut off, the light goes out, and with the current on, the lamp will illuminate with a red glow. This is merely an additional safety measure, as a glance at the cabinet will indicate whether the current is on, regardless of the position of the buttons on the line switch No. 12.

No. 10—This is the main controller for the 9-step auto transformer. Point No. 1 is the setting for the weakest output, and turning the pointer to the right increases the discharge up to maximum at point 9. You will find that the adjustment is very positive, that is, there is a very decided click as contact is made on any one of the points, and that while you can pass from maximum to minimum (from point 9 to point 1), it is impossible to turn backward from 1 to 9. This is done because a big drop in current from maximum to minimum will do no appreciable damage, whereas a sudden increase (a turn backward from 1 to 9) might be a dangerous procedure. This forms the main control for the primary current entering the transformer, whereas the spark gap No. 8 controls the volume of the secondary current after it leaves the transformer. For best results, therefore, it is quite advisable to adjust one somewhat proportionately with the other, to insure a resonant discharge.

No. 11—Line connection. Always be very sure that the line connecting cord is placed into a lamp socket on an alternating current line of the proper voltage and cycle as indicated on the nameplate, or if direct current only is available, be sure that the output of your rotary converter is exactly the same as indicated on this nameplate.

No. 12—The main line switch controls the alternating current entering the cabinet. When the white button is down, the current is on, that is, the switch is closed. When the black button is down, the current is cut off. This switch is made with the contact bars fully twice the required size for an apparatus of this nature, and this extra material is merely furnished to insure long life.

No. 13—A foot switch is an absolute necessity when performing electrocoagulation operations, and for certain other diathermy and high frequency work. The foot switch terminals are placed in the outlets No. 13, and the circuit is closed by pressing on the foot plate instead of closing switch No. 12. Switch No. 12 is left in the "off" position when the foot switch is employed.

No. 14—This fuse offers protection to the milliampere meter should you accidentally, or otherwise, pass too heavy a current through with the wrong setting of selector No. 6, or by possibly touching your electrodes or cord tips together. This fuse will blow out when approximately 1,500 milliamperes are reached with the lower scale (1,000 M. A.) adjustment. Inside the cabinet a coil is connected across this fuse circuit which carries the current after the fuse is blown, preventing the peak voltage from rising to a dangerous point and giving the patient a momentary shock, and keeps the current output within safe limits through the meter. While the fuse will glow to a dull red heat when the 1,000 milliampere point is reached on the lower scale, and 4,000 M. A. on the upper scale, it will not blow out under a 50% overload.

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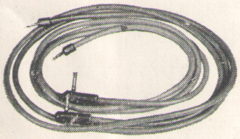
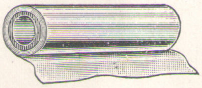
Medical Diathermy is obtained as follows: Set the indicator on the auto transformer control No. 10 on one of the lower settings (2, 3 or 4). Close the spark interrupter points No. 8 (these points should come together evenly). The rubber-covered connecting cords are used to make connections from the diathermy electrodes, which electrodes are selected to suit the individual case, to either outlets 1 and 2, 1 and 3 or 1 and 4, depending on the current output desired.

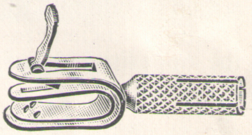

No. 1334 Cords

All tissue offers some resistance to the discharge of the diathermy current, and the greater the resistance the greater the voltage that must be employed to overcome it. Hence, outlets 1 and 4 will be suitable for very light work, 1 and 3 when the part to be treated is not very heavy, or the electrodes placed not too far apart, and 1 and 2 outlets for the heavier parts of the body.



No. 692 Block Tin

For the initial test, we suggest placing one cord tip into outlet 1, and the other into outlet 3. The other ends of the cords are slipped in the electrode clips, which in turn are fastened to the selected electrodes; we will substitute a bowl of salt water for the patient. Cut off two small pieces of sheet block tin electrode material, and attach them to the cords with the clips (catalog No. 868). Place these two pieces of metal into a bowl of brine, and see that they do not come closer than one inch one to the other. Close the line switch No. 12 and gradually open the spark interrupter points No. 8 until the meter needle shows movement. As the spark points are separated, the milliampere reading will increase. Advance controller No. 10 another point, and further separate the spark points. Decrease and increase the volume of current generated by altering both of these controllers Nos. 8 and 10, until you become thoroughly familiar with the controlling procedure. It would be well to try this a number of times with different sizes of electrodes, by using stronger and weaker brine solutions, that is, with lesser and greater resistances, until you become thoroughly familiar as to how much each individual maneuver affects the current output.



No. 868
Mesh Electrode Clamp

Now try outlets 1 and 2 in combination, and you will find that as you decrease and increase the resistances of the water medium and try various settings of the auto control No. 10, and bring together and separate the points on the spark gap, the readings will be quite different as compared to the amount of current generated when employing outlets 1 and 3.

Then try outlets Nos. 1 and 4 in combination, and you will find the results again quite different as compared to 1 and 3 and 1 and 2. It is inadvisable to apply the electrodes to the patient until you have become thoroughly familiar with the apparatus, have studied the instruction book, "Diathermy Therapy," or have had suitable instructions from one who knows the apparatus.

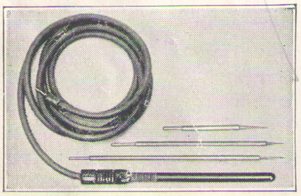
When making the above tests, be sure that your meter selector switch No. 6 is set to the 4,000 point. Then, after you have made a few tests and wish to try out lower milliamperage readings, you may set the indicator to point 1,000.

To Obtain Electro-Coagulation (Surgical Diathermy) Current Set the indicator on the auto transformer control No. 10 on one of the lower settings (2, 3 or 4). Close the spark interrupter points No. 8 (these points should come together evenly). The rubber-covered connecting cords are used to make connections from the diathermy electrodes which electrodes are selected to suit the individual case, to outlets 1 and 4.

Here, again, the item of tissue resistance must be taken into consideration, and the voltage outlets selected to suit the individual operator. Ordinarily terminals 1 and 4 supply the proper voltage, although 1 and 3 at a slightly higher potential, may be required for some work. The voltage as supplied from outlets 1 and 2 is rarely necessary for surgical procedure.

It is customary when speaking of electrocoagulation technic to refer to the *active* and *indifferent* electrodes; the active electrode being the small point or disc which is placed in direct contact with the diseased tissue, and the latter (the indifferent electrode), the larger metallic plate to cover a great deal of skin surface to prevent heating sufficient to destroy healthy tissue, is placed preferably on the opposite side of the body or at least adjacent to the point of operation.

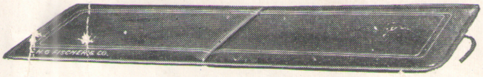
A piece of raw beef on a flat plate of block tin will best serve as the patient for the preliminary test. Grasp the insulated handle of the active coagulation electrode No. 862 at least 2 inches away from the metal end and preferably with the flexible connecting cord passing over the back of the hand. A foot switch should be employed for this work. Stepping on the foot switch closes the circuit; or if the foot switch is not employed, close line switch No. 12. Open the spark interrupter points slightly, bring the point of the active electrode down to the meat, and you will observe sparks from the point of contact and some small reading on the milliampere meter. Never fail to have meter selector indicator No. 6 either on "off" or 4,000 positions; never on the 1,000 point, as surgical work calls for very heavy current discharges, and if you leave this selector connected to the wrong scale, you are liable to burn out the meter.

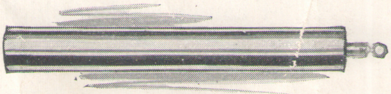


No. 862
Electrocoagulation Electrode

Press the needle-point electrode into the meat to different depths; increase and decrease the current by adjusting the spark interrupter points, and vary the voltage with the controller No. 10. Observe how the milliamperage will vary with these different settings. Now hold the electrode away from the meat a short distance, to cause sparking. You will find after making a series of these tests that you can produce varied depths of desiccation, coagulation and blanching at will. It is absolutely necessary that a series of experiments along this line be made, that you may thoroughly familiarize yourself with the current action before trying applications on living tissue. When once fully conversant with the apparatus, the required currents for various degrees of coagulation, etc., we suggest that meter selector switch indicator remain at the "off" point; that is, the meter cut out of the circuit entirely, as then should you accidentally touch your electrodes one to the other, your meter would not be damaged.

To Obtain D'Arsonval Autocondensation Current Have the current control indicator No. 10 set on point 5. Place selector No. 6 on the 1,000 mark, as autocondensation treatment readings rarely exceed 800 milliamperes. Close the spark interrupter points No. 8. The autocondensation pad is connected by means of one of the rubber-covered cables to outlet No. 2. The patient should recline comfortably on this pad, and either no pillow employed or one that is quite thin, the object being to keep the patient's entire body, even the head, as close to the pad as possible. Connect other rubber-covered cable from outlet No. 1 to the long nickel-plated handle, which handle should be held firmly in the patient's two hands. Always place a heavy folded towel or other similar insulating medium between the body and the hands, to prevent any possible leakage from the handle to the body. Some operators prefer employing an electrode of block tin placed either on the abdomen or chest instead of this No. 81 handle, and the technic is a matter of choice. Close switch No. 12 and gradually open the spark interrupter points No. 8 until a smooth flow of current is obtained, but never so far that the discharge becomes noisy or uneven in character.

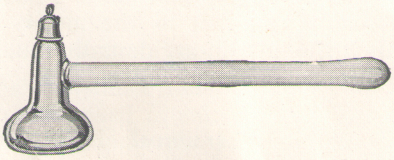

No. 418 Autocondensation Pad


No. 81
Autocondensation Handle

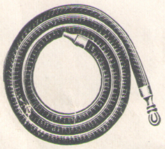
The current volume is increased and decreased by means of the auto transformer control No. 10, as well as the spark interrupter points. The distance between these points should be adjusted equally. Now have the patient rise up slightly with the current on, and observe how the reading on the milliampere meter varies as the body moves away from the pad, that is, away from the charged field. This is simply to prove to you that for maximum current effect the patient must remain close to the pad.

Indirect Diathermy This is the title given by certain operators to a slight modification of the autocondensation treatment, that is, where the indifferent electrode is the autocondensation pad and the active electrode a plate of block tin.

Unipolar High Frequency Application Set the indicator No. 10 on any one of the lower settings (2, 3, or 4), and close the spark interrupter gap No. 8. Connect the heavy insulated cable No. 83 to terminal No. 7, and to the high frequency handle. A glass electrode, either vacuum or non-vacuum type, should be held firmly in the handle clamp. As the milliampere meter No. 5 is not used in connection with this unipolar discharge, the setting of meter selector No. 6 is immaterial. Close switch No. 12 and gradually open the spark interrupter points, and increase the voltage by means of controller No. 10 until the desired amount of current is obtained through the bulb.


No. 9 High Frequency Electrode

Indirect High Frequency Applications are obtained from the same current as used for exciting the glass electrodes, directly from uniterminal No. 7, but the application is reversed. Instead of connecting the heavy cord No. 83 from uniterminal No. 7 to the high frequency handle or to the electrode direct, the current is sent through the patient by means of the metal handle No. 81. The patient grasps the No. 81 handle firmly (which is directly connected with the heavy cord to terminal No. 7), the current is turned on and regulated as for high frequency, and the discharge is withdrawn from the body with the operator's fingers at the point desired.


No. 83 H. F. Cord

Desiccation has been referred to in the past as "fulguration," and refers to a dehydrating process similar to a minor application of electrocoagulation current. The discharge is monopolar (the bipolar technic is referred to as electrocoagulation). The current is taken from the uniterminal No. 7 and is regulated by means of controller No. 10 and spark gap No. 8. This current is not measured by the milliampere meter; hence the setting of indicator No. 6 is immaterial.

Indirect Desiccation or as it has formerly been referred to "indirect fulguration," is obtained in exactly the same manner as the indirect high frequency discharge, only instead of the fingers withdrawing the current in a mild manner at the spot desired, a pointed electrode of metal is employed. This electrode must not be insulated, but the bare metal is held in the operator's fingers. The current may be extracted from the patient from a very limited area, and the effect may be one of extreme heat or merely sparking, at the will of the operator. Sufficient current to desiccate or to dehydrate only, is employed. The setting of the spark gap No. 8 is very important in this treatment, to avoid passing too much current.

Foot Switch For all electrocoagulation work, and in many instances for medical diathermy applications, a foot switch is quite necessary. The metal ends on the foot switch connecting cable are plugged into the two openings protected with rubber bushings on the left side of the cabinet. When the foot switch is pressed, it closes the circuit in place of line switch No. 12. You may leave the foot switch connected to the cabinet at all times and simply use the line switch as desired, pulling out the foot switch from under the cabinet when you wish to use it.

No. 1205 Foot Switch

CAUTIONS

Always be sure that line switch No. 12 is open, and that pilot light No. 9 is out before leaving the cabinet.

Always observe the setting of voltage control No. 10 before turning current through patient. Treatments should start with a minimum discharge and be increased gradually to maximum.

Always observe the position of the spark interrupter points on gap No. 8 before closing the circuit to the patient. These points should be closed, or nearly closed, before the current is turned on, and opened gradually to the desired milliamperage.

Do not permit electrodes or cord tips to touch one another with the current on. This creates a dead short circuit, and will undoubtedly burn out your milliampere meter.

Glass electrodes often crack after a treatment when laid against a cold surface. Bursting is caused from sudden shrinking at the point of contact.

Dust your spark gap frequently. Dust forms a partial conductor and must be removed. Clean metal surfaces on all parts of the gap radiate heat much more readily than dirty ones. Keep the gap clean.

Never leave your machine for a long period with the current on. If the outfit is not to be used for some hours, as for instance over night, the safest procedure is to cut off the current where your connecting cable is attached to the line wiring.

Never connect this apparatus to any other line current than that plainly indicated on the nameplate.

Now, last but by no means least, read the book on operating technic, or as we term it, "Diathermy Therapy" form No. 535, from cover to cover. It was written for you, Doctor, and the contents were carefully checked over. It should prove of valuable assistance to you.